McMahon

1583351 COMPLETE SPECIFICATION

2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 2

FIG. 2a

BEFORE

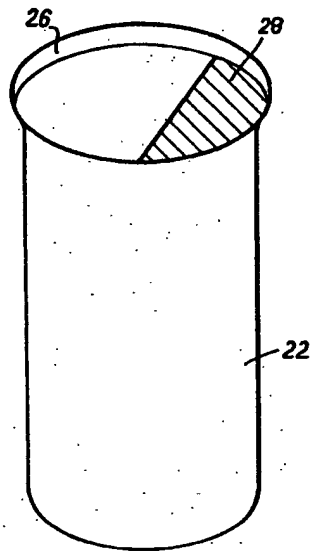
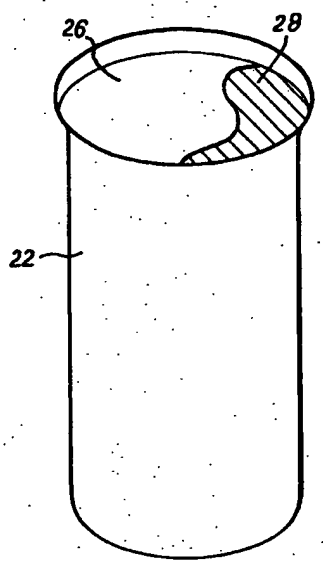


FIG. 2b

AFTER



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(54) FILLING METHOD

(71) We, GENERAL FOODS LIMITED, a British Company of Banbury, Oxon, do hereby declare the invention, for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:–

This invention relates to metal cans containing two flowable edible materials and to a method and apparatus for providing such cans.

Liquid foodstuffs are typically canned on a continuous basis using a slit filler. The filling unit comprises an elongated downwardly-directed filling orifice through which the liquid foodstuff, which has been previously bulk sterilized, is pumped. A continuous line of open top cans, touching one another to minimize spillage, passes underneath the filling unit along the line of the filling orifice at such a speed that each can emerges partially or completely filled, as desired. If it is desired to incorporate two different liquid foodstuffs in a can, the conventional practice is to use two filling units in sequence, so that, if their viscosities are high enough to prevent mixing, one foodstuff sits on top of the other in the can. The filled cans pass to a seaming unit, situated in the same conveyor line, which attaches the seams lids onto each of the filled cans in turn. The whole operation is performed aseptically, generally in an atmosphere of super-heated steam.

The rate determining steps are those of the bulk sterilization of the liquid foodstuff, and of the seaming unit. The whole operation is carried out continuously at high speed, with a throughput of typically 300-350 cans, per minute. Suitable canning equipment for this purpose is supplied, for example by James Dole Engineering Co., and is described in various Patents in that name, including for example U.S. Patents 2,667,424 (1954) and 3,442,304 (1969).

This technique is particularly suitable for canning ready-to-serve puddings, custards and other dessert sauce compositions which are 'heat sensitive'. A disadvantage is that, though it can be used to meter two r more liquids into the can in two stages these liquids can be separated only along a horizontal boundary. It would be commercially valuable to be able to meter liquids into a can which were separate from one another but in physical contact with one another along a vertical boundary. An advantage of cans so filled would be that each can could be used to provide several substantially identical servings. That is to say, each portion taken out of the can would have approximately the same proportion of the two ingredients. Side-by-side filling of this kind can be effected manually by providing a partition in the container, supplying different liquids to the container on opposite sides of the partition, and subsequently removing the partition; a technique along these lines has been described in British Patent Specification No. 1,218,280. However, the technique is necessarily a slow one and quite unsuited to the rapid continuous aseptic filling of metal cans with which this invention is concerned. These cans are of the conventional open-top type, with outwardly extending flanges (or lips) at their mouth, to enable them to be seamed or closed. These lips are especially advantageous in continuous slit filling, on account of their overlap in a moving sequence of such cans on a belt, which allows uninterrupted flow discharge without spillage.

In one aspect, the present invention provides a generally cylindrical metal can aseptically containing two flowable edible materials which are separate from one another but are in physical contact with one another along a boundary which runs substantially parallel to the axis of the can. By 'flowable edible material' we mean a material which can be made to flow, if necessary by heating, to a sufficient extent to enable it to be filled into the can through an orifice. The material in the can does not necessarily have to be capable of flowing at ambient temperature or at the time or temperature at which the can is opened. It is perfectly possible for the flowable edible material to contain dispersed solids, such as chunks of fruit in a fruit sauce, provided that it is flowable as

a whole. In principle, it is perfectly possible for the can to contain other flowable or non-flowable (e.g. solid) edible materials in addition to the two previously noted.

In another aspect, the invention provides apparatus for providing metal cans aseptically filled with two flowable edible materials which are separate from one another but are in physical contact with one another along a substantially vertical boundary, which apparatus comprises a housing aseptically enclosing:-

A filling unit comprising two adjacent elongated downwardly-directed filling orifices,

means for supplying a bulk-sterilized flowable edible material to each of the said filling orifices,

means for passing a continuous line of metal cans in contact with one another underneath the filling unit, and

means for closing the metal cans which have passed under the filling unit.

In a further aspect, the invention provides a method for providing metal cans aseptically filled with two flowable edible materials which are separate from one another but are in physical contact with one another along a substantially vertical boundary, which method comprises providing a filling unit comprising two adjacent elongated downwardly-directed filling orifices and passing to each filling orifice a liquid edible material having a viscosity of at least 20 poise but low enough to be dispensed through said filling orifice, continuously filling metal cans with the two edible materials by passing a continuous line of cans in contact with one another underneath the filling unit, and closing the filled cans, the whole operation being performed under aseptic conditions.

The invention is of particular interest in relation to ready-to-serve puddings, that is to say foodstuffs which would normally be served cold straight from the can. Such puddings are typically water-or milk-based with suitable thickening or gelling agents. The finished product when served, may be either set or not. There is, however, no reason in principle why savoury formulations such as soups, mousses and fish or meat foodstuffs should not also be packaged in this way. In order to enhance consumer appeal, it is preferred that the two flowable edible materials should be of different colours, or alternatively of different shades of the same colour; and/or different mouth-feel. It is preferred, from the view point of consumer appeal, that the physical consistency of the two layers, at the time of consumption, should be similar in thickness. In this way, the two layers can be spooned out uniformly and will not smear. For example, a water-based layer can be suitably thickened by the addition of gums like xanthan gum or locust bean gum, to give a similar consistency in the stored can to that of a milk-based gel in the second layer. The proportions of the two flowable edible materials can be equal or unequal as desired. The parameters controlling the proportions in which the two materials are fed into the can are the size of the filling orifice, the viscosity of the flowable edible material, and the pressure used to force it through the orifice. These parameters can readily be controlled by conventional methods. As the lengths of the slit-shaped filling orifices are preferably the same, control may be exercised by increasing or decreasing the width of the slits.

Parameters that affect the filling process are surface tension, temperature and viscosity of the liquid edible material, of which the most important is viscosity. If the viscosity of either or both of the components is too low, less than about 20 poise, a high degree of mixing will occur through the filling and subsequent seaming processes. It is preferred that the major component should have a viscosity of 35 to 80 poise, and the minor component of from 55 to 100 poise, both measured on entry to the can. Higher viscosities can quite readily be used, provided that the material is flowable enough to be capable of being forced through the filling orifice. The viscosity figures quoted here are determined, using a Brookfield Viscometer (No. 5 Spindle at 50 rpm).

Surface tension may be important, as the phenomenon of folding may occur through the filling head due to second order viscosity effects. This problem may be mitigated by the use of surface active agents to reduce the second order viscosity effects, but maintaining the first order viscosity.

Temperature may be important, for if there is too high a temperature difference between the components filled into the can, some mixing may occur by convection. However, this problem should not be severe provided that the viscosities of the components are high enough.

The two flowable edible materials which are to be in contact should be formulated in such a way that the water activities of the two are balanced according to the well known physical factors governing the stability of such systems. Water soluble colour may still be transmitted across the boundary by molecular diffusion, but with the area of contact between two vertical layers being small, this effect is minimised and is further diminished by the viscosity of the flowable materials.

The boundary between the two flowable edible materials dispensed into a can as described above will be substantially planar, and will be visible, on opening the can as a substantially straight line. Consumer appeal

can be further enhanced by giving this straight line a curve, and this can very readily be achieved, according to a subsidiary feature of this invention, by swirling the contents of the can.

Aseptically canned products after filling have to have can lids seamed on within the aseptic unit. Such seamers in commercial practice operate on a number of different principles, essentially divided into those where the seaming head rotates against a fixed can, and those where the can is rotated against a fixed seaming head. It has been found that the use of a rotating filled can against a fixed seaming head can produce the desired swirl effect in the contents of a twin-filled can. The speed and time of rotation of the can has to be carefully adjusted in relation to the viscosity of the contents of the can. Typically a can may be rotated at 1400 rpm for approximately 1 second on a 300 can per minute Dole filling unit; this action will provide a swirl effect provided that the viscosity of the two edible components are from 20 to 150 poise and the head space of the cans is from 1/8" to 7/8". In general, speeds of rotation are from 300 to 3000 rpm for from 0.3 to 3 seconds can provide, depending on the viscosity of the flowable edible materials in the can, a desired swirl effect.

The invention will be further described with reference to the accompanying drawings, in which:-

Figure 1 is a perspective view of apparatus including a filling unit according to the invention, and

Figures 2A and 2B show filled cans before and after the swirling operation.

Referring to Figure 1, a filling unit 10 comprises two adjacent downwardly-directed filling orifices 12 and 14. The length of the unit 10, and of each orifice 12, 14 is Z. The width of orifice 12 is Y, and of orifice 14 is X. The filling unit 10 is a hollow vessel divided by a divider 16 (shown dotted in Figure 1) into two regions. A flowable edible material, such as custard which has been pre-sterilized in bulk, is supplied via pipe 18 to one region of the filling unit 10 and thence to the filling orifice 12. A different flowable edible material, for example a fruit sauce which has also been pre-sterilized in bulk, is supplied via a pipe 20 to the other region of the filling unit 10, and thence to the filling orifice 14. The pressure in the pipes 18 and 20 is chosen in conjunction with the widths, Y and X of the filling orifices 12 and 14, so that custard and fruit sauce are dispensed in the desired proportions of about 2 to 1 by volume.

A continuous line of metal cans 22 in contact with one another pass along a conveyor belt 24 under the filling unit 10 at such a speed that they emerge just filled with edible material. The filled cans are then passed to a conventional seaming unit (not shown) of the kind where the can is rotated against a fixed seaming head, where lids are applied and sealed in position.

Figure 2A is a perspective view of a can 22 which has been filled with a milk based pudding 26 and fruit sauce 28 in the filling unit shown in Figure 1, but has not yet passed to the seaming unit. The boundary between the two materials 26 and 28 is therefore a straight line. Figure 2B shows the same can, with the lid removed after passage through the seaming unit. The boundary between the two components 26 and 28 is now curved giving the whole an attractive swirled appearance.

WHAT WE CLAIM IS:

1. A generally cylindrical metal can aseptically containing two flowable edible materials which are separate from one another but are in physical contact with one another along a boundary which runs substantially parallel to the axis of the can.

2. A can as claimed in claim 1, wherein the boundary between the two edible flowable materials is planar.

3. A can as claimed in claim 1, wherein the boundary between the two edible flowable materials is curved in a direction parallel to the axis of the can, whereby the boundary appears on the top surface of the contents of the can as a curved line.

4. Apparatus for providing metal cans aseptically filled with two flowable edible materials which are separate from one another but are in physical contact with one another along a substantially vertical boundary, which apparatus comprises a housing aseptically enclosing:-

a filling unit comprising two adjacent elongated downwardly-directed filling orifices,

means for supplying a bulk-sterilized flowable edible material to each of the said filling orifices,

means for passing a continuous line of metal cans in contact with one another underneath the filling unit, and

means for closing the metal cans which have passed under the filling unit.

5. Apparatus as claimed in claim 4 and substantially as hereinbefore described in Figure 1 of the drawings.

6. A method for providing metal cans aseptically filled with two flowable edible materials which are separate from one another but are in physical contact with one another along a substantially vertical boundary, which method comprises providing a filling unit comprising two adjacent elongated downwardly-directed filling orifices and passing to each filling orifice a liquid edible material having a viscosity of at least 20

poise but low enough to be dispensed through said filling orifice, continuously filling metal cans with the two edible materials by passing a continuous line of cans in contact with one another underneath the filling unit, and closing the filled cans, the whole operation being performed under aseptic conditions.

7. A method as claimed in claim 6, wherein the sizes of the filling orifices, the viscosities of the flowable edible materials, and the pressures used to force them through the orifices, are chosen to determine the proportion in which the two edible materials are fed into the cans.

8. A method as claimed in claim 6 or 7, wherein a major proportion of one edible material and a minor proportion of the other edible material are fed into the can.

9. A method as claimed in claim 8, wherein the major component has a viscosity of 35 to 80 poise and the minor component a viscosity of 55 to 100 poise, both measured on entry to the can.

10. A method as claimed in any one of claims 6 to 9, wherein the filled cans are closed by means of a seamer in which the can is rotated against a fixed seaming head, whereby the contents of the can are given a swirled appearance.

11. A method as claimed in claim 10, wherein the viscosity of the two materials is in the range of 20 to 150 poise and the head space in the can is from 1/8" to 7/8", and the can is rotated in the seamer at from 300 to 3000 rpm for from 0.3 to 3 seconds.

12. Metal cans as claimed in any one of the claims 1 to 3, aseptically filled with two flowable edible materials by the method of any one of claims 6 to 11.

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Sheet 1

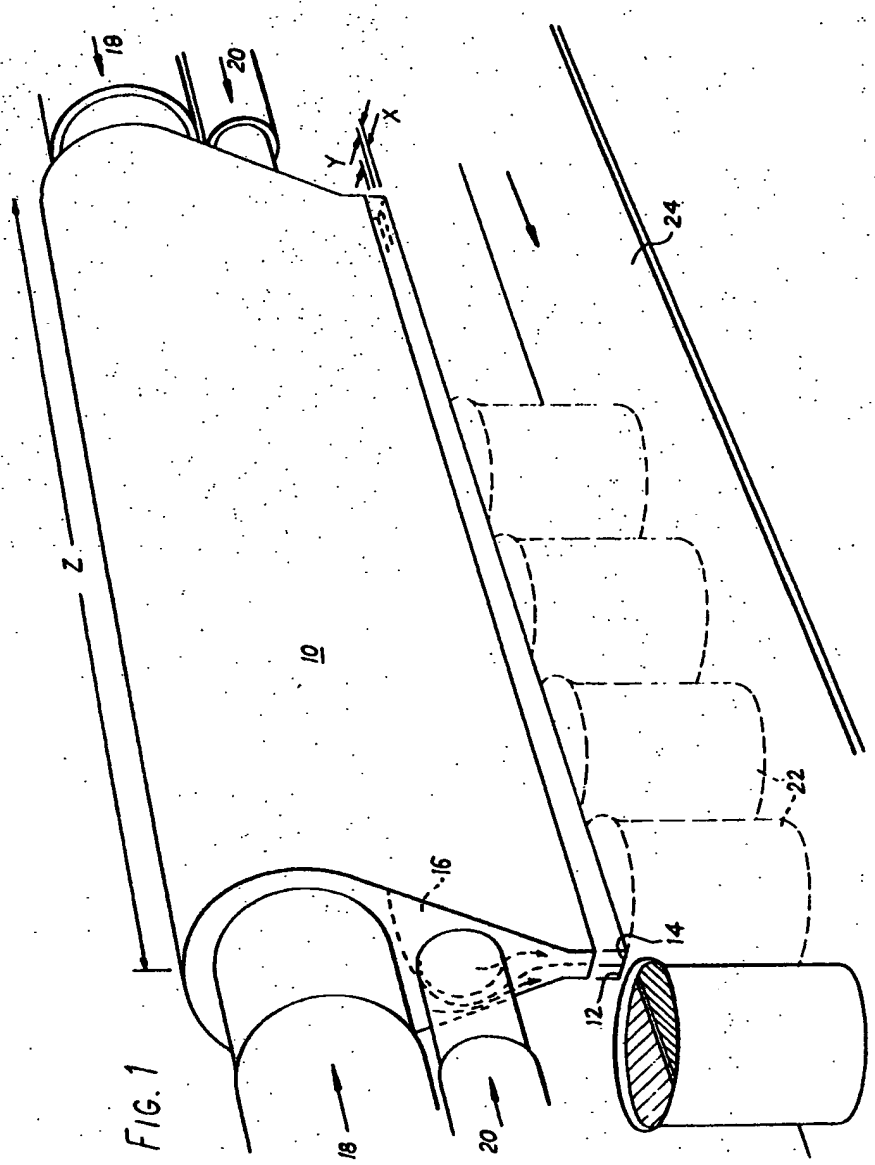

FIG. 1